

Reply to Office Action of March 08, 2005  
Amendment Dated: March 17, 2005

Appl. No.: 09/924,722  
Attorney Docket No.: CSCO-009/4342

**Listing of Claims**

1       Claim 1 (Original): A method of determining the status of a bi-directional virtual  
2       circuit in a first end system, wherein said bi-directional virtual circuit is provisioned  
3       between said first end system and another end system, said method comprising:

4           receiving in said first end system a plurality of loopback command packets from  
5       said another end system on said bi-directional virtual circuit;

6           sending from said first end system a plurality of loopback response packets to said  
7       another end system, wherein said another end system determines that said bi-directional  
8       virtual circuit is operational based on the reception of said plurality of said response  
9       packets; and

10          concluding in said first end system that said bi-directional virtual circuit is  
11       operational according to the determination of said another end system.

1       Claim 2 (Original): The method of claim 1, wherein said concluding comprises:  
2           examining a receive frequency at which said plurality of loopback command  
3       packets are received; and

4           determining that said bi-directional virtual circuit is operational if said receive  
5       frequency does not change substantially.

1       Claim 3 (Original): The method of claim 2, wherein said bi-directional virtual  
2       circuit comprises a permanent bi-directional virtual circuit provisioned on an asynchronous  
3       transfer mode (ATM) backbone, and each of said plurality of loopback command packets  
4       and plurality of loopback response packets comprises a cell.

1       Claim 4 (Original): The method of claim 3, wherein said plurality of loopback  
2       command packets and said plurality of loopback response packets are generated consistent  
3       with ITU-T Recommendation I.610.

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1       Claim 5 (Original): The method of claim 2, wherein said first end system continues  
2       to conclude that said bi-directional virtual circuit is operational if said receive frequency  
3       does not change substantially and does not send new loopback command packets to said  
4       another end system.

1       Claim 6 (Original): The method of claim 5, further comprising:  
2            sending another plurality of loopback command packets at a sending frequency; and  
3            comparing said sending frequency with said receive frequency, wherein said first  
4       end system determines not to send new loopback command packets based on said  
5       comparing.

1       Claim 7 (Original): The method of claim 6, wherein said first end system  
2       determines not to send new loopback command packets if said sending frequency is less  
3       than said receiving frequency.

1       Claim 8 (Original): The method of claim 6, wherein said first end system waits a  
2       random amount of time before stopping sending new loopback command packet if said  
3       sending frequency is at least approximately equal to said receive frequency.

1       Claim 9 (Original): The method of claim 1, wherein each of said first end system  
2       and said another end system comprises an edge router.

1       Claim 10 (Original): A first end system determining the status of a bi-directional  
2       virtual circuit, wherein said bi-directional virtual circuit is provisioned between said first  
3       end system and another end system on a network backbone, said first end system  
4       comprising:

5            an interface coupled to said network backbone, said interface receiving a plurality  
6       of loopback command packets from said another end system on said bi-directional virtual  
7       circuit;

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8 a memory storing information indicating whether said bi-directional virtual circuit  
9 is operational; and

10 a processor sending a plurality of loopback response packets to said another end  
11 system in response to receiving said plurality of loopback command packets, wherein said  
12 another end system determines that said bi-directional virtual circuit is operational based  
13 on the reception of said plurality of said response packets, said processor storing data in  
14 said memory indicating that said bi-directional virtual circuit is operational if said another  
15 end system determines that said bi-directional virtual circuit is operational.

1 Claim 11 (Original): The first end system of claim 10, wherein said processor  
2 examines a receive frequency at which said plurality of loopback command packets are  
3 received and determines that said bi-directional virtual circuit is operational if said receive  
4 frequency does not change substantially.

1 Claim 12 (Original): The first end system of claim 11, wherein said bi-directional  
2 virtual circuit comprises a permanent bi-directional virtual circuit provisioned on an  
3 asynchronous transfer mode (ATM) backbone, and each of said plurality of loopback  
4 command packets and plurality of loopback response packets comprises a cell.

1 Claim 13 (Original): The first end system of claim 12, wherein said plurality of  
2 loopback command packets and said plurality of loopback response packets are generated  
3 consistent with ITU-T Recommendation I.610..

1 Claim 14 (Original): The first end system of claim 11, wherein said first end system  
2 continues to conclude that said bi-directional virtual circuit is operational if said receive  
3 frequency does not change substantially and does not send new loopback command  
4 packets to said another end system.

1 Claim 15 (Original): The first end system of claim 14, further comprising:

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2 sending another plurality of loopback command packets at a sending frequency; and  
3 comparing said sending frequency with said receive frequency, wherein said first  
4 end system determines not to send new loopback command packets based on said  
5 comparing.

1 Claim 16 (Original): The first end system of claim 15, wherein said memory  
2 continues to indicate that said bi-directional virtual circuit is operational if said sending  
3 frequency is less than said receiving frequency.

1 Claim 17 (Original): The first end system of claim 15, wherein said first end system  
2 waits a random amount of time before stopping sending new loopback command packet  
3 if said sending frequency is at least approximately equal to said receive frequency.

1 Claim 18 (Original): The first end system of claim 10, wherein each of said first end  
2 system and said another end system comprises an edge router.

1 Claim 19 (Original): The first end system of claim 10, wherein said memory stores  
2 a virtual circuit (VC) table, wherein said VC table stores data indicating whether said bi-  
3 directional virtual circuit is operational.

1 Claim 20 (Original): The first end system of claim 10, wherein data packets are  
2 transmitted on said bi-directional virtual circuit only if said memory indicates that said bi-  
3 directional virtual circuit is operational.

1 Claim 21 (Original): A first end system determining the status of a bi-directional  
2 virtual circuit, wherein said bi-directional virtual circuit is provisioned between said first  
3 end system and another end system on a network backbone, said first end system  
4 comprising:

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5 means for receiving a plurality of loopback command packets from said another end  
6 system on said bi-directional virtual circuit;

7 means for sending a plurality of loopback response packets to said another end  
8 system, wherein said another end system determines that said bi-directional virtual circuit  
9 is operational based on the reception of said plurality of said response packets;

10 means for storing data indicating whether said bi-directional virtual circuit is  
11 operational or not; and

12 means for concluding that said bi-directional virtual circuit is operational according  
13 to the determination of said another end system, wherein said means for concluding causes  
14 said means for storing to store data to indicate that said bi-directional virtual circuit is  
15 operational.

1 Claim 22 (Original): The first end system of claim 21, wherein said means for  
2 concluding determines a receive frequency at which said plurality of loopback command  
3 packets are received and determines that said bi-directional virtual circuit is operational  
4 if said receive frequency does not change substantially.

1 Claim 23 (Original): The first end system of claim 22, wherein said bi-directional  
2 virtual circuit comprises a permanent virtual circuit provisioned on an asynchronous  
3 transfer mode (ATM) backbone, and each of said plurality of loopback command packets  
4 and plurality of loopback response packets comprises a cell.

1 Claim 24 (Original): The first end system of claim 23, wherein said plurality of  
2 loopback command packets and said plurality of loopback response packets are generated  
3 consistent with ITU-T Recommendation I.610.

1 Claim 25 (Currently Amended): A computer readable medium carrying one or more  
2 sequences of instructions for causing a first end system to determine the status of a bi-  
3 directional virtual circuit, wherein said bi-directional virtual circuit is provisioned between

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4 said first end system and another end system, wherein execution of said one or more  
5 sequences of instructions by one or more processors contained in said ~~gateway device~~ first  
6 end system causes said one or more processors to perform the actions of:

7 receiving a plurality of loopback command packets from said another end system  
8 on said bi-directional virtual circuit;

9 sending a plurality of loopback response packets to said another end system,  
10 wherein said another end system determines that said bi-directional virtual circuit is  
11 operational based on the reception of said plurality of said response packets; and

12 concluding that said bi-directional virtual circuit is operational according to the  
13 determination of said another end system.

1 Claim 26 (Original): The computer readable medium of claim 25, wherein said  
2 concluding comprises:

3 examining a receive frequency at which said plurality of loopback command  
4 packets are received; and

5 determining that said bi-directional virtual circuit is operational if said receive  
6 frequency does not change substantially.

1 Claim 27 (Original): The computer readable medium of claim 26, wherein said bi-  
2 directional virtual circuit comprises a permanent virtual circuit provisioned on an  
3 asynchronous transfer mode (ATM) backbone, and each of said plurality of loopback  
4 command packets and plurality of loopback response packets comprises a cell.

1 Claim 28 (Original): The computer readable medium of claim 27, wherein said  
2 plurality of loopback command packets and said plurality of loopback response packets  
3 are generated consistent with ITU-T Recommendation I.610.

1 Claim 29 (Original): The computer readable medium of claim 26, wherein said first  
2 end system continues to conclude that said bi-directional virtual circuit is operational if

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3 said receive frequency does not change substantially and does not send new loopback  
4 command packets to said another end system.

1       Claim 30 (Original): The computer readable medium of claim 29, further  
2 comprising:

3            sending another plurality of loopback command packets at a sending frequency; and  
4            comparing said sending frequency with said receive frequency, wherein said first  
5 end system determines not to send new loopback command packets based on said  
6 comparing.

1       Claim 31 (Original): The computer readable medium of claim 30, wherein said first  
2 end system determines not to send new loopback command packets if said sending  
3 frequency is less than said receiving frequency.

1       Claim 32 (Original): The computer readable medium of claim 30, wherein said first  
2 end system waits a random amount of time before stopping sending new loopback  
3 command packet if said sending frequency is at least approximately equal to said receive  
4 frequency.

1       Claim 33 (New) The method of claim 1, wherein said another end system sends said  
2 plurality of loopback command packets according to a first pattern if said another end  
3 system determines that said bi-directional virtual circuit is operational and according to a  
4 second pattern otherwise, wherein said concluding is based on the pattern with which said  
5 plurality of loopback command packets are received from said another end system.

1       Claim 34 (New) The first end system of claim 10, wherein said another end system  
2 sends said plurality of loopback command packets according to a first pattern if said  
3 another end system determines that said bi-directional virtual circuit is operational and  
4 according to a second pattern otherwise, wherein said processor stores said data in said

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5 memory if said plurality of loopback command packets are received from said another end  
6 system with said first pattern.

1           Claim 35 (New) The first end system of claim 21, wherein said another end system  
2 sends said plurality of loopback command packets according to a first pattern if said  
3 another end system determines that said bi-directional virtual circuit is operational and  
4 according to a second pattern otherwise, wherein said means for concluding concludes  
5 based on the pattern with which said plurality of loopback command packets are received  
6 from said another end system.

1           Claim 36 (New) The computer readable medium of claim 25, wherein said another  
2 end system sends said plurality of loopback command packets according to a first pattern  
3 if said another end system determines that said bi-directional virtual circuit is operational  
4 and according to a second pattern otherwise, wherein said concluding is based on the  
5 pattern with which said plurality of loopback command packets are received from said  
6 another end system.